The Olentangy River Wetland Research Park:

Progress Report for 2003

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Summary

This publication offers the twelfth consecutive annual report on teaching, research, service, and development at the Olentangy River Wetland Research Park (ORWRP). It covers progress in calendar year 2003, the tenth year of hydrologic operation of the two 2.5-acre experimental wetland "kidneys" on the site, the seventh year of ecological development of our 7-acre mitigation wetland "billabong," the fifth year of the Sandefur Wetland Pavilion, and the first year of occupancy of the Heffner Wetland Research and Education Building.

Twenty-four courses from 5 OSU Colleges (FAES, MAPS, ENG, BIOSCI, SBS) and several other universities used the ORWRP in 2003. Two masters' theses and one Ph.D. in wetland ecology were completed in 2003/early 2004, raising the total number of theses and dissertations completed at the ORWRP to 44. Five short courses on wetland restoration, wetland delineation, ecological engineering, and ecosystem modeling were taught in 2003 to 55 participants from 19 states/provinces. One hundred thirty-three tours or presentations of the ORWRP were given in 2003 to almost 2000 participants as public outreach.

Grants and contracts totalling $2.2 million were active at the ORWRP in 2003. Approximately $362,000 in donations were secured in 2003, about the same as the $365,000 secured in 2002. These donations included several in-kind contributions related to the wetland building construction. The $2.8 million Wetland Research and Education Building at the ORWRP was completed and occupied in 2003. The economic impact of the ORWRP to The Ohio State University in income from grants, contracts, development, and short course fees over its 12-year history has been $5.4 million, not counting its significant academic and wetland management contributions.

Why a Wetland Research Park?

Wetlands are shallow to intermittently flooded ecosystems that are more commonly known by such terms as swamps, bogs, marshes, and sedge meadows. They are revered as important parts of the natural landscape because of their functions in cleaning and retaining water naturally, preventing floods, and providing a habitat and food source for a wide variety of plant and animal species. It is estimated that more than half of the original wetlands in the lower 48 states have been lost to drainage projects and human development projects. Ohio has lost about 90 percent of its original wetlands.

When we lose wetlands, we lose their ability to provide clean water, prevent floods, and enhance biological diversity. Many organizations are calling for construction of new wetlands to clean up our streams, rivers, and lakes. The National Academy of Sciences has called for the restoration and creation of 10 million acres of wetlands in the United States by the year 2010. Five million acres of wetlands in the Mississippi River Basin have been suggested as being necessary to help prevent the dead zone, or hypoxia, in the Gulf of Mexico (Mitsch et al. 2001; Mississippi River Basin Task Force 2001). The U.S. Army Corps of Engineers oversees a regulatory program that results in tens of thousands of acres of wetlands being restored and created each year to replace wetlands that are lost to development. Futhermore, the largest wetland and riverine restorations in the world, at costs that will exceed $20 billion, are underway or planned for the Everglades and Louisiana Delta. But a National Academy of Sciences panel (NRC 2001) determined that much more research is needed before we can be assured that mitigation wetlands, those wetlands that are constructed to replace wetlands destroyed for development, can be successful. In order to solve such problems we need to know: 1) how wetlands work; 2) if we can create and restore them; and 3) the best approaches to creation and restoration of wetlands. The Olentangy River Wetland Research Park is designed to be a long-term, large-scale wetland research facility on a major college campus. There is no other facility of its kind on any other campus in the USA.

Progress at OSU's Wetland Site

The Olentangy River Wetland Research Park is located on a 30-acre site owned by the Ohio State University, immediately north of Dodridge Road and adjacent to the Columbus campus (Figures 1 and 2). The site has been developed in three phases:

Phase 1 — Construction of two experimental wetland basins and their water delivery system;

Phase 2—Development of a research and teaching infrastructure at the site including boardwalks, experimental mesocosms, a plant-material greenhouse, additional wetlands, instrumentation for long-term research, and a visitor pavilion; and

Figure 1. Aerial photograph of Olentangy River Wetland Research Park, Ohio State University, August 2003.

Figure 2. Status of of the Olentangy River Wetland Research Park at the end of 2003.

Phase 3—Development and construction of the Wetland Research and Education Building on the site.

Phase 1 of site development, which featured construction of two 2.5-acre deepwater marshes and a river water delivery system, was completed in 1994. Pumps were installed on the floodplain to bring water from the Olentangy River to the wetlands and pumping officially began on March 4, 1994. River water is pumped continuously, day and night, into the two wetlands. It then flows by gravity back to the Olentangy River through a swale and constructed stream system. In May 1994, one wetland basin was planted with marsh vegetation typical of wetlands in the Midwest; the other remained as an unplanted control.

Phase 2, establishing the infrastructure for research and education of the site, began in 1994 and was completed with the dedication of the Sandefur Wetland Pavilion in 1999.

Phase 3, the construction of the $2.8 million Wetland Research and Education Building at the ORWRP, began with the receipt of $1.18 million in 2 grants from the Ohio Board of Regents in 1999 and 2000 in their Hayes Investment Fund competition. The grants were the result of an effort of a 5-university consortium of Ohio institutions—Ohio State, Wright State, Shawnee State, Youngstown State, and Kenyon College. Additional support for the building was obtained through donations and pledges. The decision to go forward with building construction was made on December 13, 2001. Construction began in spring 2002 and was mostly completed except for some interior work by March 2003. Our staff and students began moving into the building on March 6, 2003. Providing lab and office furnishing contined through much of 2003.

Teaching, Research, and Service

Teaching

Teaching in a "living laboratory" setting has been an emphasis at the Olentangy River Wetland Research Park since its inception. From the time that a Natural Resources graduate seminar class in 1991 helped to design the project, dozens of formal courses involving thousands of students have used the site annually for ecological or other learning related to wetlands, surrounding uplands or the river. These formal courses have included classes on wetland ecology, water quality, ecological engineering, anthropology, architecture, general chemistry, wildlife management, animal ecology, groundwater hydrology, geography, ornithology, and forestry. Twenty-four courses involving over 400 students formally used the site in 2003 (Table 1). The class were from 5 OSU Colleges (FAES, ENG, BIOL, MAPS, and SBS) Classes from several other Ohio colleges—Columbus State and Denison University—used the wetlands for field trips in 2003. In addition, a wetland ecology course came all the way from West Virginia University in Morgantown, WV, to visit the ORWRP in Autumn 2003.

A total of 44 students have completed dissertations, master's theses, or honors undergraduate theses with partial or full use of the Olentangy River Wetland Research Park from 1992 through early 2004 (Table 2). One master's thesis was completed in 2003 and two other degrees—one Masters and 1 Ph.D.—were completed in early 2004. While most studentswriting theses are from Ohio State departments, there have been 5 students from Europe (two from UK, three from Denmark) who collected thesis data at the ORWRP.

Research

Over $2.2 million in contracts and grants were active at the ORWRP in 2003 (Table 3). It is unlikely that any of this funding would have been awarded if the ORWRP was not present at Ohio State University. The projects included FGD coal combustion product recycling project (Ohio Department of Development, Bill Wolfe, PI), bottomland hardwood forest restoration (Ohio Department of Transportation, Mitsch, PI), and wetland pulsing (U.S.D.A., Mitsch and Schwartz, PI's). Two grants totalling $1,118,000 from the Ohio Board of Regents to for the Wetland Research and Education Building at the Olentangy River Wetland Research Park were also actively in 2003.

Public Outreach

The ORWRP had several significant public activities in 2003. On April 12, 2003, a "Wetland Planting Day" was held at the ORWRP for the general public (Figure 3). Over 200 volunteers came to the Olentangy River Wetland Research Park to plant the new wetlands around the new research building, plant trees in the deciduous forest and around the oxbow wetlands, remove invasive plant species from our forested wetlands, and clean up trash.

Another major event was held at the Olentangy River Wetland Research Park on May 15-16, 2003 (Figure 4). At our "Wetland Invitational," supported by the Ohio State University Office of Research, twelve of the world's best wetland scientists were invited to the ORWRP to present papers related to wetland restoration and preservation throughout the world (Figure 5). Another highlight of the program was a welcome provided by new Ohio State University President Karen Holbrook (Figure 4). All 12 speakers were awarded plaques that designated their talks as "Moonlight on the Marsh Distinguished Lectures," and a permanent plaque in the new building lobby includes a list of these talks.

President Holbrook returned for an extended tour of the Olentangy River Wetland Research Park on August 4, 2003 (Figure 6). The president was also accompanied by Vice President Ellyn Perrone. She was hosted by Professors William J. Mitsch and Bill Wolfe, SNR Director Gary Mullins, and ORW Committee members Bill Heffner and Bill Resch. The tour included visits through the Heffner Wetland Research and Education Building, the Sandefur Wetland Pavilion, the bottomland hardwood forest, the billabong (oxbow), and the city bikepath. A discussion of research, teaching, and development needs was held at the conclusion of the tour in the building lobby.

Table 1. Formal class use of Olentangy River Wetland Research Park, 2003.

Term	Colllege	Course	Number of students	Instructor
Winter 2003	FAES	NR 693 Independent Research-ORW projects	5	Mitsch
	BIOL	Entomology 102 Insect Biology II	29	Dave J. Horn
	BIOL	EEOB 625 Mammology	24	John D. Harder
	FAES	NR 760 Ecosystem Modeling	20	Mitsch
	FAES	NR 797B Wetland and River Restoration	12	Mitsch
		Columbus State Geology 101	20	Kelly Rutthan-Jorgensen
Spring 2003	ENG	LARCH 622 Landscape Architecture	8	Brooks Breeden
	ENG	LARCH 323 Landscape Architecture	45	Brooks Breeden
	SBS	Geog H294 Global Climate and Env. Change	20	Ellen Mosley Thompson
	BIOL	EEOB 210 Native Flora	25	Liz Harris
Summer 2003	FAES	ES/NR 999 Independent Research	3	Mitsch
	BIOL	EEOB 210 Native Flora	15	Liz Harris
	FAES	Vet Medicine 700.08	12	Cliff Monahan
Autumn 2003	BIOL	Entomology 641 Insect Ecology	18	Dave J. Horn
	BIOL	EEOB 641 Conservation Biology	27	John D. Harder
	FAES	NR 662 Wildlife Ecology Methods	40	David Gates
	MAPS	Chem 221 Honors Chemistry Quantitative Analysis	15	Susan Olesik
	MAPS	Geol Sci 651 Hydrogeology	9	M. Ibaraki
	FAES	NR 725 Wetland Ecology and Management	33	Mitsch
		Denison University BIOL/ENVS 310 Wetland Ecology	15	Doug Spieles
		West Virginia University Bio 793J Wetland Ecology	15	Mark Walbridge
	FAES	Plant Pathology 395	8	Ann Lighthauser
	MAPS	Geol Sci 999 Independent Research	1	Frank Schwartz
	FAES	ES/NR 999 Independent Research	5	Mitsch
	TOTAL NUMBER OF STUDENTS		424	
	TOTAL NUMBER OF CLASSES		24	

Table 2. Theses and dissertations completed at the Olentangy River Wetland Research Park through early 2004.

Ph.D. dissertations (11)

- **Deni Porej** "Faunal aspects of wetland creation and restoration" Ph.D. dissertation, Evolution, Ecology, and Organismal Biology (2004)
- **Changwoo Ahn** "Ecological engineering of wetlands with a recycled coal combustion byprooduct" Ph.D. dissertation, Environmental Science Graduate Program (2001)
- **John J. Gutrich** "Ecological and economic analysis of natural capital: Assessing and modeling the substitutability of mitigation wetlands for natural sites" Ph.D. dissertation, Department of Agricultural, Environmental, and Developmental Economics (2000)
- **Michael A. Liptak** "Water column productivity, calcite precipitation, and phosphorus dynamics in freshwater marshes" Environmental Science Graduate Program (2000)
- **John J. Gutrich** "Ecological and economic analysis of natural capital: Assessing and modeling the substitutability of mitigation wetlands for natural sites" Environmental Science Graduate Program (2000)
- **Douglas J. Spieles** "Nutrient retention and macroinvertebrate community structure in constructed wetlands receiving wastewater and river water" Environmental Science Graduate Program (1998)
- **Randall J.F. Bruins** "Modeling of flooding response and ecological engineering in an agricultural wetland region of Central China" Environmental Science Graduate Program (1997)
- **Neal E. Flanagan** "Comparing ecosystem structure and function of constructed and naturally occurring wetlands: Empirical field indicators and theoretical indices" Environmental Science Graduate Program (1997)
- **Robert W. Nairn** "Biogeochemistry of newly created riparian wetlands: evaluation of water quality changes and soil development" Environmental Science Graduate Program (1996)
- **Naiming Wang** "Modelling phosphorus retention in freshwater wetlands" Environmental Science Program (1996)
- **Paul E. Weihe** "Colonizing and introduced vegetation in created riparian wetlands: Establishment during the first two growing seasons" Environmental Science Graduate Program (1996)

Master's theses (18)

- **Eric Lohan** "A methodology to ecologically engineer watersheds for nitrogen nonpoint source pollution control" Environmental Science Graduate Program (2004)
- **Mark Dilly** "Atrazine fate in a created wetland" Environmental Science Graduate Program (2003)
- **Sarena M. Selbo** "Hybridization between native and introduced populations of cattail and big bluestem: Conservation implications, Evolution, Ecology, and Organismal Biology (2002)
- **Cheri Higgins** "Ecosystem engineering by muskrats (*Ondatra zibethicus*) in created freshwater marshes" Environmental Science Graduate Program (2002)
- **Amie M. Gifford** "The effect of macrophyte planting on amphibian and fish community use of two created wetland ecosystems in central Ohio" Environmental Science Graduate Program (2002)
- **Daniel F. Fink** "Efficacy of a newly created wetland at reducing nutrient loads from agricultural runoff" Environmental Science Graduate Program (2001)
- **Matthew Cochran** "Effect of hydrology on bottomland hardwood forest productivity in central Ohio (USA)" Natural Resources (2001)
- **Sarah K. Harter** "Patterns of short-term sedimentation in a freshwater created marsh" Natural Resources (1999)
- **Sharon A. Johnson** "Effects of hydrology and plant introduction on first-year macrophyte growth in a newly created wetland" Natural Resources (1998)
- **Lisa J. Svengsouk** "First-year response of *Typha latifolia* L. and *Schoenoplectus tabernaemontani* (K.C. Gmel.) Palla to nitrogen and phosphorus additions in experimental mesocosms" Environmental Science Graduate Program (1998)
- **Kathleen D. Metzger** "Self-design of a fish community in a created riparian freshwater marsh: A simulation model" Environmental Science Graduate Program (1997)
- **John S. Koreny** "Hydrology of a constructed riparian wetland system: Characterization and predictive modeling" Environmental Science Graduate Program (1996)
- **Uygar Özesmi** "A spatial habitat model for the marsh-breeding red-wing blackbird (*Agelaius phoeniceus*) in coastal Lake Erie wetlands" Environmental Science Graduate Program (1996)
- **Doreen M. Dudek** "Tree growth responses to streamflow in a bottomland forest in central Ohio" Natural Resources (1995)
- **Steven F. Niswander** "Functional analysis of a created in-stream mitigation wetland: hydrology, phosphorus retention, and tree growth" Natural Resources (1994)
- **Renée F. Wilson** "Progress and success of five mitigation wetlands in Ohio" Natural Resources (1995)
- **Karen M. Wise** "Evaluation of acid mine drainage control by a constructed wetland in southeastern Ohio" Natural Resources (1994)
- **Frank D. Voss** "Groundwater investigation of Ohio State University wetland site" Geodetic Science (1993)

Undergraduate honors theses (10)

- **Katherine E. Kleber** "Fish population and movement within planted and naturally colonizing experimental wetlands, autumn 2000" Natural Resources (2000)
- **Erika A. Filippi** "The role of soil organic matter on denitrification potential in newly created wetlands" Natural Resources (1998)
- **Bonnie F. Elfritz** "A comparison of natural wetlands with a constructed wetland using the Floristic Quality Assessment Index" Natural Resources (1998)
- **Kimberly K. Schamp** "Groundwater patterns before and after wetland construction at the Olentangy River Wetland Research Park" Natural Resources (1997)
- **Nicole L. Vorwerk** "Comparison of three years of pH values between planted and unplanted wetlands at the Olentangy River Wetland Research Park" Natural Resources (1997)
- **Rainie D. Gardner** "Fish recruitment in the Olentangy River constructed wetlands" Natural Resources (1997)
- **Tonya Cheek** "Effect of fish on wetland water quality" Natural Resources (1996)
- **Andrew W. Wehr** "Early water quality of created wetlands at the Olentangy River Wetland Research Park" NaturalResources (1995)
- **Michael E. Berkal** "Hydrology and water chemistry of the Olentangy River in Worthington (Franklin County), Ohio, and their potential effects on a future constructed wetlands facility downstream in Columbus, Ohio" Natural Resources (1992)
- **Douglas G. Stuart** "Intensive water quality sampling in two constructed riparian wetlands" Natural Resources (1992)

Theses at other universities (5)

- **Rikki Bronnum** "The effects of alachlor on denitrifying bacteria in mesocosms and created wetlands in central Ohio, USA" Master's Thesis, Environmental Chemistry, University of Copenhagen (2001)
- **Hojeong Kang** "The significance of enzyme activities in wetland biogeochemistry" University of Wales, UK (1999)
- **Pernille Mortensen** and **Pernille Lanzky** "Water quality improvement in a constructed wetland" Thesis, Royal Danish School of Pharmacy, Copenhagen, DENMARK (1996)
- **Rebecca Smith** "Nitrogen transfer in groundwater in the riparian zone of the Olentangy River, Columbus, Ohio" Thesis, Cambridge University, Cambridge, England, UK (1996)

Figure 3. Wetland Planting Day, a special volunteer day held at the Olentangy River Wetland Research Park on Saturday April 12, 2003

Figure 4. President Karen Holbrook opens the Wetland Invitational held at the Olentangy River Wetland Research Park, May 15-16, 2003. The event was had 200 participants and featured 12 of the world's best wetland scientists as speakers.

Figure 5. Speakers at the May 15-16 Wetland Invitational at the Olentangy River Wetland Research Park: Curt Richardson, Duke University; Rob Brooks, Penn State University; Mark Brown, University of Florida; Bill Mitsch, Ohio State University; John Day, Louisiana State University; Dennis Whigham, Smithsonian Environmental Research Center, MD; Ed Garbisch, Environmental Concern, Inc., MD; Siobhan Fennessy, Kenyon College; Don Hey, The Wetlands Initiative, Chicago; Wolfgang Junk, Max Planck Institute, Plön, Germany; Jim Amon, Wright State University; Tom Crisman, University of Florida.

Figure 6. President Karen Holbrook visits the Olentangy River Wetland Research Park, August 4, 2003.

Table 3. Funded research projects active at the Olentangy River Wetland Research Park in 2003.

RF #	Short title	Funding Source	College	Amount	end date
	Control Agricultural Runoff of Nitrogen	Payne Ag Ecosystems	FAES/MAPS	$145,000	6/30/04
744736	Restoration of Mississippi River Basin	Louisiana State University	FAES	$94,000	6/30/04
745333	Importance of hydrologic pulsing	USDA	FAES/MAPS	$272,000	8/31/06
738587	Wetland monitoring and management	Ohio Dept of Transportation	FAES	$75,000	5/4/06
738869	Reuse of clean coal FGD material	Ohio Dept of Development	ENG/FAES	$544,000	6/30/04
739039	Reuse of clean coal FGD material (suppl.)	West Virginia University	ENG	$25,000	6/30/04
	Hayes Investment Fund	Ohio Board of Regents	FAES	$1,180,000	12/31/03
	TOTAL			$2,235,000	

In collaboration with the local environmental group FLOW (Friends of Lower Olentangy Watershed), OSU student volunteers, especially newly arriving freshmen, volunteered to help harvest and remove the invasive shrub Amur honeysuckle (*Lonicera maackii*) from the bottomland hardwood forest at the ORWRP as part of its restoration. Approximately 30 students and FLOW volunteers participated at the September 23, 2003, event. Ohio Department of Transportation provided the chipper to grind up the woody material and deposit it on "honeysuckle way"—the wood chip path around the experimental wetlands.

The ORWRP also hosted a workshop (Figure 7) on October 22, 2003 at the Blackwell Hotel at OSU entitled "Ecological Restoration of the Mississippi-Ohio-Missouri (MOM) Basin: Identifying Research Needs." The event, sponsored by the Louisiana State University, Ohio State University, and the U.S. Army Corps of Engineers, was the beginning of an Ohio State University/Louisiana State University collaboration on solving problems such as nutrient over-enrichment in the Mississippi River delta. The event was opened by OSU President Holbrook and Chancellor Mark Emmert of Lousiana State University. Formal presentations were given by William J. Mitsch (Ohio State University), John W. Day (Louisiana State University), William G. Crumpton (Iowa State University), Ronald F. Turco (Purdue University), Donald L, Hey (The Wetland Initiative), and Alex Echols (Sand County Foundation). A panel discussion on focusing Federal research support completed the day's public program.

Wetland Tours

Formal tours and presentations of the ORWRP continued to be among our more popular public service contributions in 2003. The ORWRP conducted 133 tours or public presentations on the Olentangy River Wetland Research Park in 2003 to almost 2000 participants (Table 4). Groups receiving tours ranged from the Board of Directors of the Ohio Audubon Society to 45 high school students from the Martin Essex School for the Gifted. Over the past decade, the ORWRP has conducted over 800 wetland tours for over 16,000 individuals and the number of tours accelerated with the completion of the new wetland research and education building (Figure 8).

An extraordinary list of distinguished visitors came to the wetlands in 2003 including the speakers from the May Wetland Invitational and the October workshop and others: Curt Richardson, Duke University; Rob Brooks, Penn State University; Mark Brown, University of Florida; John Day, Louisiana State University; Dennis Whigham, Smithsonian Environmental Research Center; Ed Garbisch, Environmental Concern, Inc.; Siobhan Fennessy, Kenyon College; Don Hey, The Wetlands Initiative; Wolfgang Junk, Max Planck Institute; Jim Amon, Wright State University; Tom Crisman, University of Florida; Bill Crumpton, Iowa State University; Ron Turco and George Parker, Purdue University; and Alex Echols, Sand County Foundation; Lance Gunderson, Emory University; Walter Chen, Taiwan National University; Karen Holbrook, Ohio State University; Mark Walbridge, West Virginia University; Bob Nairn, University of Oklahoma (ORWRP alum); Ralph Tiner, IWEER, Massachusetts; Robin Lewis, Lewis Environmental, FL; Sven Jørgensen, Royal Danish School of Pharmacy, Copenhagen; and Paco Comin, Instituto Pirenico de Ecologia, Zaragoza, Spain.

Publications

There were 5 peer-reviewed papers, 2 technical reports, and 1 thesis added to the ORWRP reprint collection in 2003 (Table 5).

Wetland Short Courses

Five short courses were taught in 2003 in the wetland program. One course was taught in Naples, Florida. The other 4 courses were the first to use the new conference room in the Heffner Wetland Research and Education Building. Courses in Columbus use wetlands at the ORWRP and elsewhere in central Ohio (Figure 9). The courses attracted 55 students from 19 states/provinces: NH, FL, MO, PA, DC, VA, IN, MT, OH, GA, NE, IL, AL, MI, NY, MN, TN, Virgin Islands, and Quebec, Canada. The students were primarily from environmental consulting firms or state and Federal agencies and were quite pleased with the content of the courses.

Workshop on

Ecological Restoration of the Mississippi-Ohio-Missouri (MOM) Basin

Identifying Research Needs

This workshop marks the beginning of an Ohio State University/ Louisiana State University collaboration on solving problems such as nutrient over-enrichment in the Mississippi River delta.

Purposes:

1) to summarize research on ecological solutions, e.g. wetlands, in the Midwest to control nitrogen and other nutrient pollution in the Mississippi/Ohio/ Missouri Basin

2) to identify the research needed to reduce uncertainties of these ecological approaches.

General Schedule
1:30 – 6:00 pm
PUBLIC PROGRAM

October 22, 2003 (Wednesday)
The Blackwell
2110 Tuttle Park Place
The Ohio State University,
Columbus, Ohio

1:30 pm Welcoming addresses
Karen A. Holbrook, President,
The Ohio State University
Mark Emmert, Chancellor,
Louisiana State University

1:45 – 2:15
William J. Mitsch, The Ohio State University
"You can't restore the estuary if you don't fix the watershed: Downstream and local benefits of wetland restoration in the Midwest"

2:15 – 2:45
John W. Day, Louisiana State University
"Deterioration and restoration of the Mississippi delta"

2:45 – 3:15
William G. Crumpton, Iowa State University
"Restoring wetlands as N sinks in agricultural watersheds: siting, design, and performance considerations"

3:30 – 4:00
Ronald F. Turco, Purdue University
"Constructed wetlands for removal of nutrients from on-point sources"

4:00 – 4:30
Donald L. Hey, The Wetlands Initiative, Chicago
"Nutrient farming: The business of environmental management"

4:30 – 5:00
Alex Echols, Sand County Foundation, Washington DC
"Market-based incentives for reducing agricultural nitrogen discharge"

5:00 - 6:00
Panel Discussion Focused on Research Support Federal Agency representatives, e.g., U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Department of Agriculture

To register:
e-mail thompson.38@osu.edu or call
Olentangy River Wetland Research Park at 292-9774.

Co-Sponsored by:
Louisiana Department of Natural Resources
US Army Corps of Engineers
Olentangy River Wetland Research Park
The Ohio State University
Coastal Ecology Institute
Louisiana State University

Figure 7. Program for the workshop on the Restoration of the Mississippi-Ohio-Missouri Basin, held at the Blackwell Hotel at Ohio State University, October 22, 2003.

Table 4. Tours and presentations of the Olentangy River Wetland Research Park in 2003

Date	note	Organization	Est. #
1/21/03	*	Matt Freeman, Apple Computer	1
1/23/03		Tri-Village Lions (Fairfield Inn)	55
2/3/03	*	Odine Wilhelm, prospective student	1
2/5/03	*	Columbus State - Geology Department	20
2/12/03	*	Tom Stallenworth, Smith and Schaffer	1
2/19/03	*	Battelle, Wetland Planting Meeting	5
2/27/03	**	Jose Bechara, Institute of Ichthyology, National University, Argentina	2
3/6/03	**	Lance Gunderson, Emory University	1
3/18/03	*	Bobby Moser, FAES	1
3/18/03	*	Bill Heffner, Agg Rok	2
3/21/03	*	Rusty Neff, Camp Dresser & McKee	2
3/22/03	*	Ohio Center for Wetland and River Restoration, Annual Meeting	10
3/27/03	*	ORW Advisory Committee	12
4/2/04	*	Ramon Battles and Friends	5
4/9/03	*	Fort Hayes High School	30
4/9/03	*	Open House for SNR faculty and staff	30
4/12/03	*	Wetland Planting Event	200
4/18/03	*	English Second Language - OSU	15
4/24/03	*	Lori Anderson	1
4/29/03	*	John Disinger, Professor Emeritus	1
5/1/03	*	Landscape Architecture class w/Brooks Breeden	50
5/7/03	*	Macomb Pirnie Architects	2
5/7/03	*	John Young, Hemet, CA	1
5/7/03	*	Dension University conference tour	2
5/10/03	*	Megan Ruf, New Jersey (alum)	1
5/14/03	*	John W. Day, LSU	2
5/15-16/03	*	Wetland Invitational (Open House/Symposium)	210
5/16/03	**	Curt Richardson, Duke Univ.; Mark Brown and Tom Crisman, Univ. of Florida	10
5/19/03	*	Art and Maxine Dachmke	2
5/19/03	*	Tour - EEOB Tom Waite, Tom Heatherington	2
5/19/03	*	Youngstown State University	3
5/21/03	*	Steib Hall	6
5/21/03	*	Keneth and Margie Sauer, UC Berkeley	2
5/21/03	*	Ellen-Mosley Thompson's class- Geog H294 Global Climate and Env Change	20
5/22/03	*	Tim and Connie Johnson and friends	4
5/22/03	*	Andrew Bartz, Eagle Scout candidate	2
5/22/03		Ecological Engineering group seminar	20
5/24/03	*	Vice President Bill Shkurti, OSU and son	2
5/27/03	*	Boy Scouts	10
5/29/03	*	Mary Berghoff, New Haven, IN	3
5/30/03	*	Adrianne Sobach (2 classes)- Columbus Metro Parks	50
5/30/03	*	Cliff Mohahan, Vet Medicine	1
5/31/03	*	Girl Scouts	8
6/2/03	*	Grade School Class	10
6/5/03	*	Columbus State	11
6/5/03	*	General tour	3
6/6/03	*	Bil and Rosemary Studer	2
6/10/03	*	Ben Reynolds, Columbus	1
6/23/03	*	Peg Stigerwald, Clintonville; Jen Brudbury, New Albany	2
6/23/03		Ag Education (Kelly Koren)	30
6/25/03	*	Roger Race, YSI	1
6/26/03	*	Lili Wang, Battelle	2
6/26/03	*	Sherry Hubbard	2
6/27/03	*	Martin Langurs, OSU Prof emeritus and Master Gardener	3
7/1/03	*	Ken McKibbin, Lancaster	1
7/2/03	**	Walter Chen, Taiwan National University	1
7/3/03	*	Mitsches	10
7/3/03	*	Nancy Glaser, Louisville, KY	1
7/9/03	*	Creation and Restoration Short Course	14

7/11/03	*	Vet Medicine 700.08 w/ Cliff Monahan	12
7/11/03	*	Upper Arliington High School	5
7/15/03	*	R. Hanson famon, Lagos, Nigeria	10
7/18/03	*	American Chemical Society Disadvantaged Students (EMSI)	20
7/22/03	*	Wellington School	15
7/23/03	*	Junior Master Garden Club	15
7/23/03	*	Cliff Monahan and Ved Medicine students	5
7/25/03	*	Shirley-Brooks Jones/Susan Miller ORW committee	2
7/26/03	*	Frank and Nell Hamburge, St. Paul, MN	3
7/28/03	**	Lei Yang, Dept. of Marine Environment and Engineering, National Sun Yat-sen Univ, Kaohsiung, Taiwan	2
7/29/03	*	Laura Busby, Audubon Society	15
7/30/03	*	Jim Lane, Melissa Lane, Bobbi Fisher, Walter Foundation	5
8/4/03	**	OSU President Karen Holbrook	10
8/6/03	*	Sonia Bohrer-Bowen	3
8/7/03	*	Marin Essex School for Gifted	45
8/7/03	*	Bob Whyte, Antioch, OH	9
8/8/03	*	Terry Stadt, Mt. Sterling, OH	2
8/18/03	*	Wetland Delineation Course	17
8/20/03	*	Sarah Harter, Athens, OH alum	3
8/21/03	*	ODOT/OEPA/ODNR Bottomland Review	7
8/21/03	*	Cliff Monahan and Ved Medicine students	3
8/21/03	*	Julie Wolin, Danny Dunn, Union Grove, AL	2
8/24/03	*	Chris Anderson relatives including Bonnie and Dave Anderson, Woodbridge, VA	6
8/27/03	*	CREP ODNR Project Group	20
8/30/03	*	Donor Party before OSU-Washington gmae	80
8/30/03	*	College of Engineering Development Tour	20
9/6/03	*	OSU v. San Diego State Tailgate Party	10
9/12/03	*	Home School	50
9/13/03	*	OSU v. North Carolina State Tailgate Party	20
9/16/03	*	Ted Blahnik, Indianapolis consultant	8
9/20/03	*	OSU v. Bowling Green Tailgate Party	20
9/23/03	*	FLOW/OSU volunteer honeysuckle removal	30
9/29/03	*	Ecological Modelling Short Course	6
9/30/03	*	Sao Paulo Students - International Affairs	15
10/3/03	*	Ag Affairs Committee of Board of Trustees	20
10/6/03	*	Ecological Engineering Short Course	6
10/9/03	*	OSU freshmen	30
10/11/03	*	FLOW	20
10/11/03	*	Marilyn Walters, Hendersonville, NC	3
10/13/03	*	Battelle	3
10/14/03	*	Scotland International Visitors	30
10/17/03	**	John Baletto, PSEG	1
10/18/03	*	OSU v. Iowa game	11
10/21/03	*	Graham School	15
10/22/03	**	Chancellor LSU	2
10/23/03	*	Mississippi River Basin Workshop Participants	5
10/24/03	*	Home School	10
10/26/03	**	Mark Walbridge and class from WVU	15
10/28/03	*	OSU Civil Engineering Dept. - Wellington School tour - 10th grade #1	25
10/28/03	*	OSU Civil Engineering Dept- Wellington School tour - 10th grade #2	25
11/1/03	*	Audubon - Ohio Board of Directors	10
11/3/03	*	Denison University Biol/ENVS 310	15
11/4/03	**	Undan, President of Phillipines	3
11/4/03	*	Malcomb Pettigrew, potential OSU student	2
11/5/03	*	Plant Pathology 395 Ann Lightheiser	8
11/8/03		OSU President's Brunch - tour by swamp cam	110
11/9/03	*	Laura and Steven Shinn	2
11/14/03	**	Bob Nairn, University of Oklahoma	2
11/15/03	*	OSU v. Purdue	20
11/17/03	*	New Albany Environmental Science Program (10 high schools), Bill Somerlot	42
11/18/03	*	ORW Advisory Committee	10
11/18/03	*	Mark Rowe	2

11/18/03	**	Dr. Shambhushivananda, Bangkok, Thailand	4
11/21/03	*	Clintonville Academy	35
11/21/03	*	Home School	10
11/21/03	*	Madiera Boys Club	15
11/24/03	**	Prof. Paco Comin, Zaragoza, Spain	2
11/25/03		Biiological Engineering Student Group	10
11/29/03	*	Ridgeview Middle School	8
12/30/03	*	Bob and Bernadette Mitsch	5
12/1/03	**	T.K. Sen, National Bureau of Soil Survey, Nagput, India	2
12/3/03	*	Plant Pathology tour	4
12/4/03	**	David Reed, Professor, Defiance College	1
12/9/03	**	Carlos Hernandez, EARTH University, Costa Rica	1
12/18/03	*	ORW Christmas Party	40
			___
		TOTAL	1980
		# of Tours/Presentations	133

*site tour
**site tour with visiting scientist or distinguished visitor

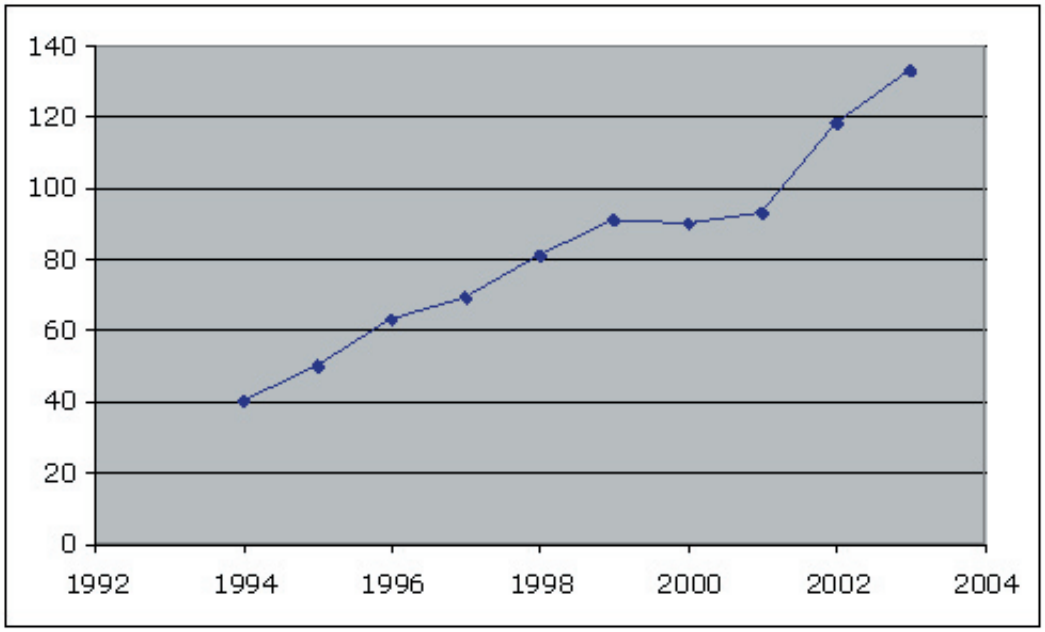

Figure 8. Number of wetland tours given at the ORWRP, 1994-2003. Increase after 2001 due partially to new building.

Table 5. Peer-reviewed publications of the Olentangy River Wetland Research Park reprint list in 2003

Papers

03-005 Mitsch, W.J. and S.E. Jorgensen. 2003. Ecological engineering: A field whose time has come. Ecological Engineering 20: 363-377.

03-004 Mitsch, W.J. 2003. Ecology, ecological engineering, and the Odum brothers. Ecological Engineering 20: 363-377.

03-003 Day. J.W. Jr., A. Yanez Arancibia, W.J. Mitsch, A.L. Lara-Dominguez, J.N. Day, J.-Y. Ko, R. Lane,and J.Lindsey. 2003. Using ecotechnology to address water quality and wetland habitat loss problems in the Mississippi Basin: A hierarchical approach. Biotechnology Advances 22: 135-159.

03-002 Spieles, D.J. and W.J. Mitsch. 2003. A model of macroinvertebrate trophic structure and oxygen demand in freshwater wetlands. Ecological Modellling 161: 183-194.

03-001 Harter, S.K. and W.J. Mitsch. 2003. Patterns of short-term sedimentation in a freshwater created marsh. Journal of Environmental Quality 32: 325-334.

Theses/Dissertations

Mark A. Dilley. 2003. Atrazine fate in a created wetland. Masters thesis, Environmental Science Graduate Program, The Ohio State University. Advisor: Samual Traina

Figure 9. ORWRP Wetland Creation and Restoration short course participants at Ross Labs mitigation wetland, Franklin County, July 11, 2003.

Table 6. Press and media coverage of the Olentangy River Wetland Research Park, 2003

Date	Article Title or Event	Publication
Spring 2003	“Chemistry Department Nets Top Honors for Teaching”	OSU Chemistry Magazine
May 19, 2003	“Research thrives at wetlands park”	The Columbus Dispatch
June 10, 2003	“Restoring wetlands may aid dead zone”	The Times-Picayune (New Orleans)
August 25, 2003	“Shrimp Industry Finds Life in Gulf Coast ‘Dead Zone’”	Los Angeles Times
September 2003	“Sandefur Wetland Pavilion”	onCampus
September 3, 2003	“Storms bring life back to gulf’s ‘dead zone’”	The Seattle Times
September 4, 2003	“Constructed wetlands in the environment is workshop focus”	Purdue News
September 30, 2003	“Ohio State, LSU seek ways to clear up gulf’s ‘dead zone’”	The Columbus Dispatch
October 2, 2003	“OSU, LSU work to save Mississippi watershed”	The Lantern
October 14, 2003	“Research park prime spot for OSU fans”	The Columbus Dispatch

Publicity

The Olentangy River Wetland Research Park and its research and teaching were publicized 10 times during 2003 in newspaper articles and other publications (Table 6). Copies of articles published on the site or our wetland research in 2003 are given in the Appendix.

Development

The Olentangy River Wetland Research Park has been supported in its 13 years (1991-2003) through private donations to the University. Through December 2003, the equivalent of over $2.2 million has been raised for the wetland project (Table 7; Figure 10), almost all from corporations and individuals. In 2003, there were 289 donations totalling $361,000. In 2002, there were 264 identifiable donations totalling $365,000. Because momentum had built, 2003 should have resulted in more donations than the previous year; the loss of Leigh Briggs as a College development officer after July 2003 was a serious blow to fund raising in 2003 as a replacement was not named until early 2004. A full 7 months of development inactivity resulted.

About 27% of the donations received at the ORWRP have been as in-kind contributions. In-kind support obtained over the years includes donation of 4.9 acres of land on the southeastern corner of the ORWRP adjacent to river (value of $75,000), two four-wheel drive vehicles, construction of the billabong wetland, and groundwork for the new building. In 2003, in-kind donations included gravel for building construction (Heffner/Agg Rok), a paved driveway (Heffner/Agg Rok), and civil engineering for building construction (Bischoff Miller Inc.).

Research and Education Building

The Wetland Research and Education Building (Figure 11 and 12) is now complete. The building allows researchers to take full advantage of the campus wetlands and relieves the wetlands program of overcrowded labs, offices, and research facilities in Kottman Hall. The YSI Data Control Center was established in 2003; it includes computer file servers where physical, chemical, and biological data are stored and analyzed and displays in the lobby where data are displayed. This display serves as a starting point for wetland site tours. The building design also includes a conference room for continuing education-type short courses that before were taught in local hotels that charged meeting room fees. The building also includes faculty and student offices, laboratories for water and gas analysis, a soil-water-plant analysis prep room (mud room), and a wetland library. Nine graduate students are housed in the building and four or five undergraduate students work as technicians and site engineers there.

The cost of the building after bids was determined to be approximately $2.8 million. By the end of 2003, most of the money had been raised or pledged for the building, including grants from the Ohio Board of Regents, development funds, and support from OARDC. A $330,000 loan from OARDC in 2002 allowed the entire building to be constructed; $150,000 of that loan has been paid back through 2003.

The Master Plan

Substantial progress has been made on the Olentangy River Wetland Research Park for the past decade. Phase 2 was completed in 1999 and Phase 3, the construction of a wetland research and education building, was essentially completed in 2003. Occupancy began March 6, 2003. A bike path, paved driveway, interpretative signs, and a resting bench, all requested by donors as part of their contributions, were added to the ORWRP in 2003. The site master plan essentially is done and is the same as the existing map shown in Figure 2.

Wetland Endowment

In addition to capital costs, the building, the ecosystems, and site infrastructure at the ORWRP will require continued operational funds. A goal of $1.5 million was established for an endowment to maintain this campus wetland area in perpetuity. One endowment account is for building support. The other account, provided by the Heffner family, includes support for the undergraduate site engineer who maintains the ORWRP site. Through 2003, $265,000 has been raised for the ORWRP endowment.

ORWRP's Impact

Through 2003, the economic and academic impacts of the ORWRP on Ohio State University and the world of wetland science have been significant. Over its development and operation, the ORWRP has resulted in the following economic advantages to the University:

Wetland Short Course Fees	$150,000
Extramural Grants and Contracts	$3,070,000
Donations	$2,200,000
Total impact	$5,420,000

Over the period 1992-2003, the project has also been responsible for the following academic achievements that cannot always be given economic value:

- completion of 44 undergraduate and graduate student theses and dissertations at OSU, including 5 from European institutions;
- publication of 109 papers listed in the ORWRP reprint series,
- completion of 12 comprehensive annual reports summarizing all research accomplished at the ORWRP,
- leadership of over 800 formal wetland tours and presentations for the public to an estimated 16,000 individuals including K-12 students, university students, garden clubs, campus visitors, and Federal, state, and local public officials.
- provision of a convenient set of campus ecosystems in

Table 7. Donation support for the Olentangy River Wetland Research Park through 2003.

Year	Number of donations	Total amount of donations	In-kind donations*	Endowment donations	Non-building donations**	Building fund
2003	289	$361,569	$71,403	$50,956	$108,687	$130,523
2002	264	$365,056	$80,510	$ 445	$20,143	$263,933
2001	319	$248,416	$75,000	$1,140	$9,984	$162,292
2000	250	$237,077	$31,300	$97,620	$22,129	$86,028
1999	165	$115,626	$3,705	$94,000	$6,782	$11,138
1998	149	$98,839	$23,624	$4,415	$63,360	$7439
1997	168	$78,228	$13,503	$300	$61,215	$3,213
1996	146	$221,889	$187,78	$4,000	$30,105	
1995	108	$97,184	$36,516	$11,000	$49,668	
1994	86	$62,686	$48,744		$13,942	
1993	46	$259,206	$21,215		$237,991	
1992	7	$59,347	$6,327		$53,020	
TOTAL	1998	$2,205,121	$592,980	$263,901	$683,676	$664,564

* In-kind includes construction of 7-acre billabong in 1996 ($170,000), donation of 5 acres of bottomland forest in 2001 ($75,000), earthwork and gravel for building construction (2002-03), paved driveway (2003), and civil engineering for building (2003)

** Includes construction of wetlands in 1992-95 ($330,000), Sandefur Wetland Pavilion in 1997-98 ($100,000), bikepath and signage in 2003 ($50,000) and instrumentation requred with donations in 2002-03 ($70,000).

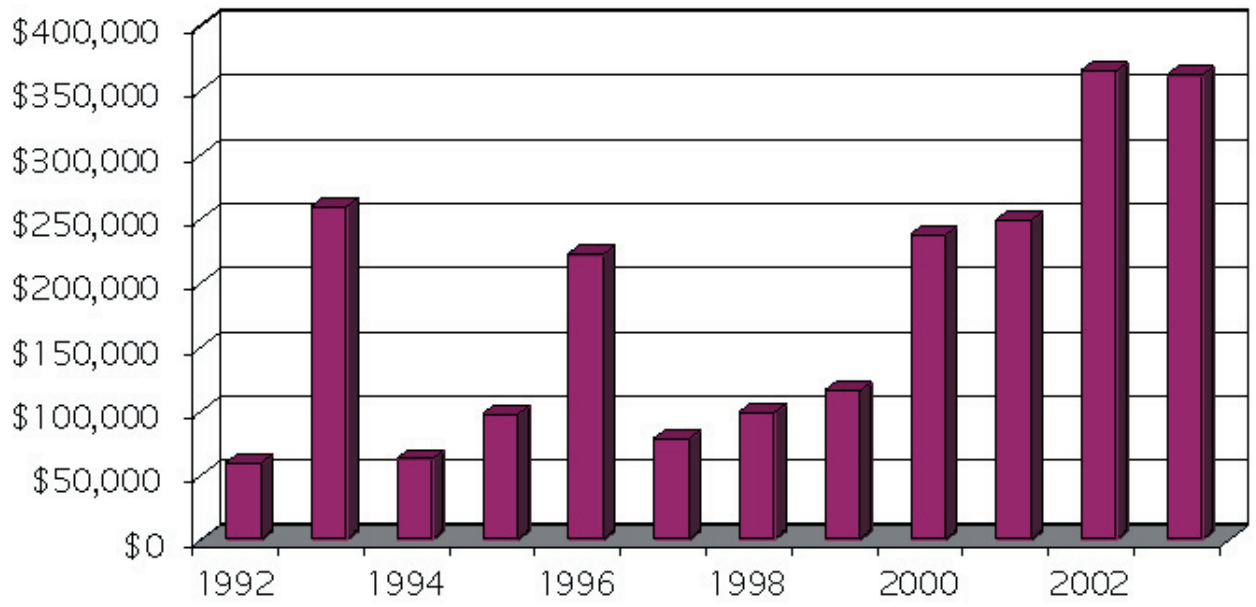

Figure 10. Total development support for Olentangy River Wetland Research Park, 1992-2003

Figure 11. Heffner Wetland Research and Education Building after completion, July 2003

Figure 12. Wetland building reception area and YSI data control center wall, July 2003

support of an estimated 140 Ohio State University classes in 5 university colleges.

• provision of a controlled research site for a 100 students doing independent research, often unfunded. The ORWRP has supported the research and teaching programs of more than 40 OSU professors and senior researchers from 6 OSU Colleges and scientists from other Ohio institutions.

• education of 230 agency personnel, consultants, and students in 17 wetland short courses taught since 1996.

• development of the fields of wetland science and ecological engineering to the point where they have led to a significant improvement in Ohio's and the nation's environment.

References

Mississippi River/ Gulf of Mexico Watershed Nutrient Task Force. 2001. Action plan for reducing, mitigating, and controlling hypoxia in the northern Gulf of Mexico. Report submitted to U.S. Congress, U.S. Environmental Protection Agency, Washington, DC.

Mitsch, W.J., J. W. Day, Jr., J. W. Gilliam, P. M. Groffman, D. L. Hey, G. W. Randall, and N. Wang. 2001. Reducing nitrogen loading to the Gulf of Mexico from the Mississippi River Basin: Strategies to counter a persistent large-scale ecological problem. BioScience 51: 373-388.

National Research Council. 2001. Compensating for Wetland Losses under the Clean Water Act. National Academy Press, Washington, DC, 322 pp.